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Date Oct. 15, 1958 Signed Richard E. Reedy
OFFICE SECURITY ADVISOR

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THE HYDROFOIL CORPORATION

89 A WEST STREET

ANNAPOLIS, MD.

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TECHNICAL MEMORANDUM No. HM-19

Gilruth Boat

Prepared for: Office of Naval Research
Washington, D. C.
Contract No. Nonr-13601

November 20, 1951

Copy No. 10

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November 20, 1951

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**THE HYDROFOIL CORPORATION
TECHNICAL MEMORANDUM HM-19**

Subject: Gilruth Boat

**Prepared for
Office of Naval Research
Washington, D. C.
Contract No. Nonr-13601**

by

Frederic E. Bolliger

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THE HYDROFOIL CORPORATION

TECHNICAL MEMORANDUM HM-19

November 20, 1951

Subject: Gilruth Boat

Prepared for: Office of Naval Research, Washington, D. C.
Under Contract No. Nonr-13601

By: Frederic E. Bolliger

References: HFC Drawing No. 1067

1. Introduction.

A hydrofoil craft designed as a sail boat and known as the Gilruth Boat became the property of The Hydrofoil Corporation. It was decided to convert the boat to an engine driven, experimental hydrofoil craft.

2. Design Features.

a. Platform.

For simple and inexpensive manufacture combined with low weight and good rigidity a wooden structure with plywood reinforcements was used for the platform which was mounted on the catamarans, struts and foils of the boat.

The pilot's seat is adjustable fore and aft on the platform.

b. Propulsion.

The craft is equipped with a standard 5 H.P. outboard motor which is carried by a coil spring balanced parallelogram that permits ready depth adjustment of the propeller.

A float chamber is built around the engine to guard against submergence of the engine.

c. Controls.

The controls are arranged as follows:

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The right hand of the pilot operates:

1. Main stick to control elevation flap on rear foil.
2. Rotatable knob on main stick to control engine throttle and spark advance.

The left hand operates:

3. Auxiliary stick to control dual rudder.
4. Rope and cam action jam cleat to control engine position.

The feet operate:

5. Dual pedals to control the ailerons.

3. Physical Data.

Length overall	13'2"
Beam (Span of main foil)	11'0"
Draft with crew, maximum	2'10"
Weight of craft	405 lbs.
Weight of crew	180 lbs.
Weight of craft with crew	585 lbs.
Main foil NACA 64-208	
Chord, main foil	12.5"
Thickness, main foil	1.0"
Area, projected, main foil	10.9 sq. ft.
Rear foil with elevation flap NACA 64-208	
Chord, rear foil	9.25"
Thickness, rear foil	0.74"
Area, projected, rear foil	3.95 sq. ft.
Ailerons, NACA 64-412	
Chord, ailerons	6.0"
Thickness, ailerons	0.72"
Area, projected, ailerons (each)	1.25 sq. ft.
Estimated speed on foils	5 - 7 knots

4. Load Distribution and Foil Loading.

- a. With pilot in seat and seat in full aft position:

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The main foil and ailerons carry 86.8% of the weight	508 lbs.
The main foil loading is	37.9 lbs/sq.ft.
The rear foil carries 13.2% of the weight	77 lbs.
The rear foil loading is	19.5 lbs/sq.ft.

b. With pilot in seat and seat in full forward position:

The Main foil and ailerons carry 88.3% of the weight	517 lbs.
The main foil loading is	38.6 lbs.
The rear foil carries 11.7% of the weight	68 lbs.
The rear foil loading is	17.2 lbs/sq.ft.

5. Propulsion Unit.

The propulsion unit consists of a standard Mercury KF-5 outboard motor with a rated output of 5 H.P. at 4200 R.P.M.

The propeller has a 6 3/4" diameter and 6 1/2" pitch.

6. Conclusion.

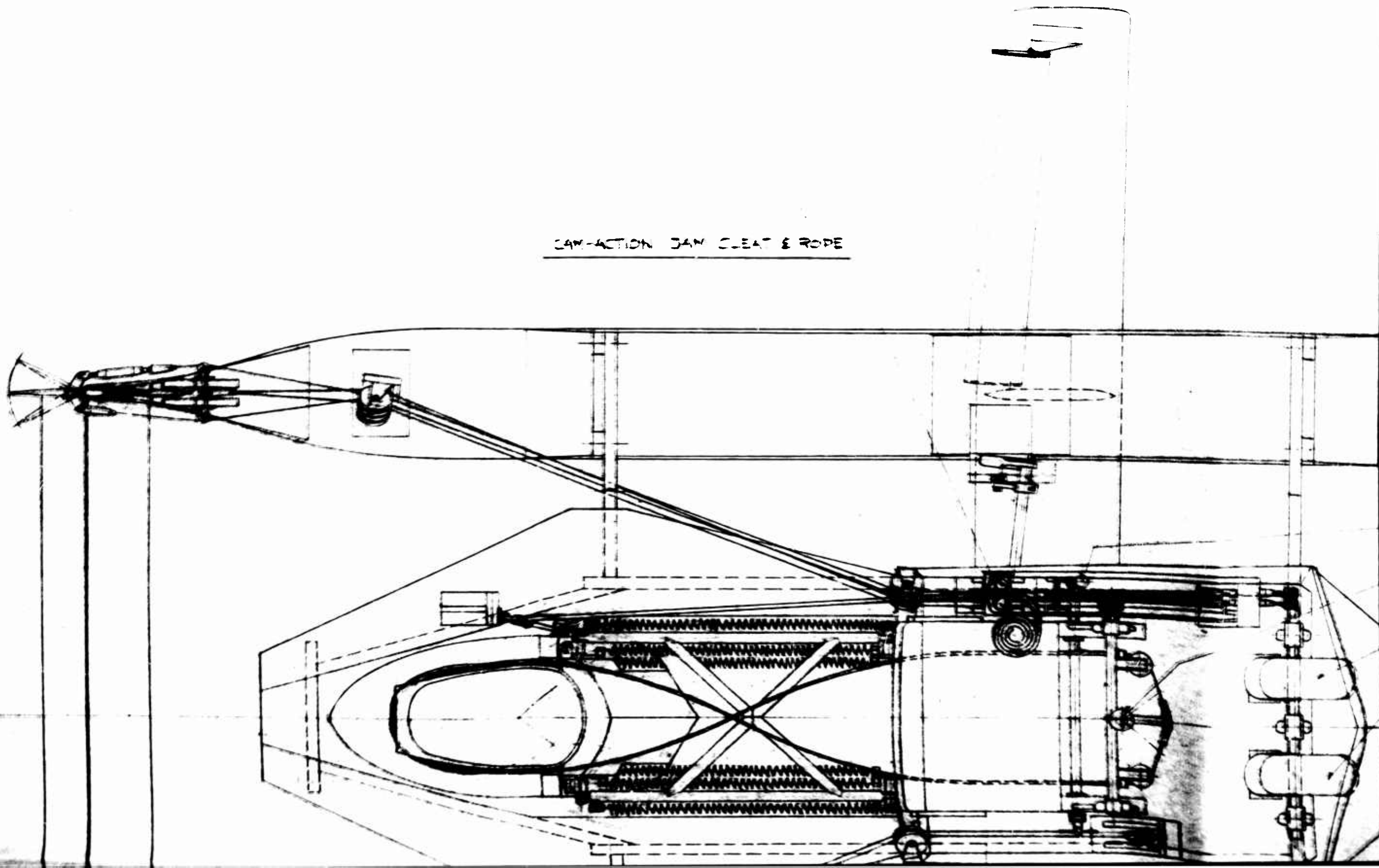
The craft has been tested under varying conditions. The craft can be flown easily with manual controls. The performance of the craft in straight flight and in turns is very satisfactory.

Frederic E. Bolliger

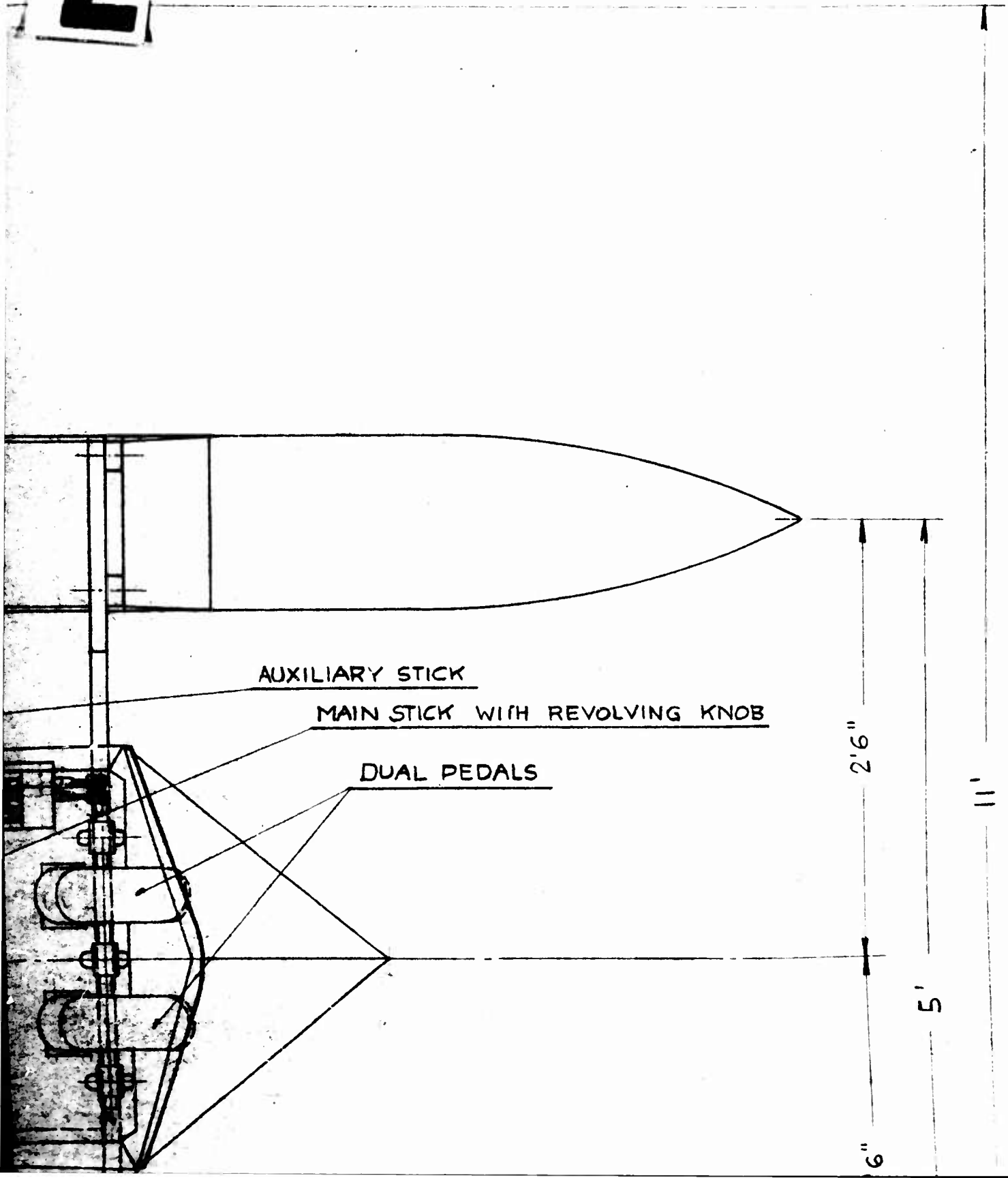
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1

CAN-ACTION JAW CLEAT & ROPE



2



LENGTH OVERALL
BEAM (SPAN OF MAIN FOIL)
MAX. DRAFT WITH CREW (A

WEIGHT OF CRAFT
WEIGHT OF PILOT
WEIGHT OF CRAFT WITH

MAIN FOIL NACA 64-20
CHORD
THICKNESS
AREA PROJECTED

REAR FOIL NACA 64-2
CHORD
THICKNESS
AREA

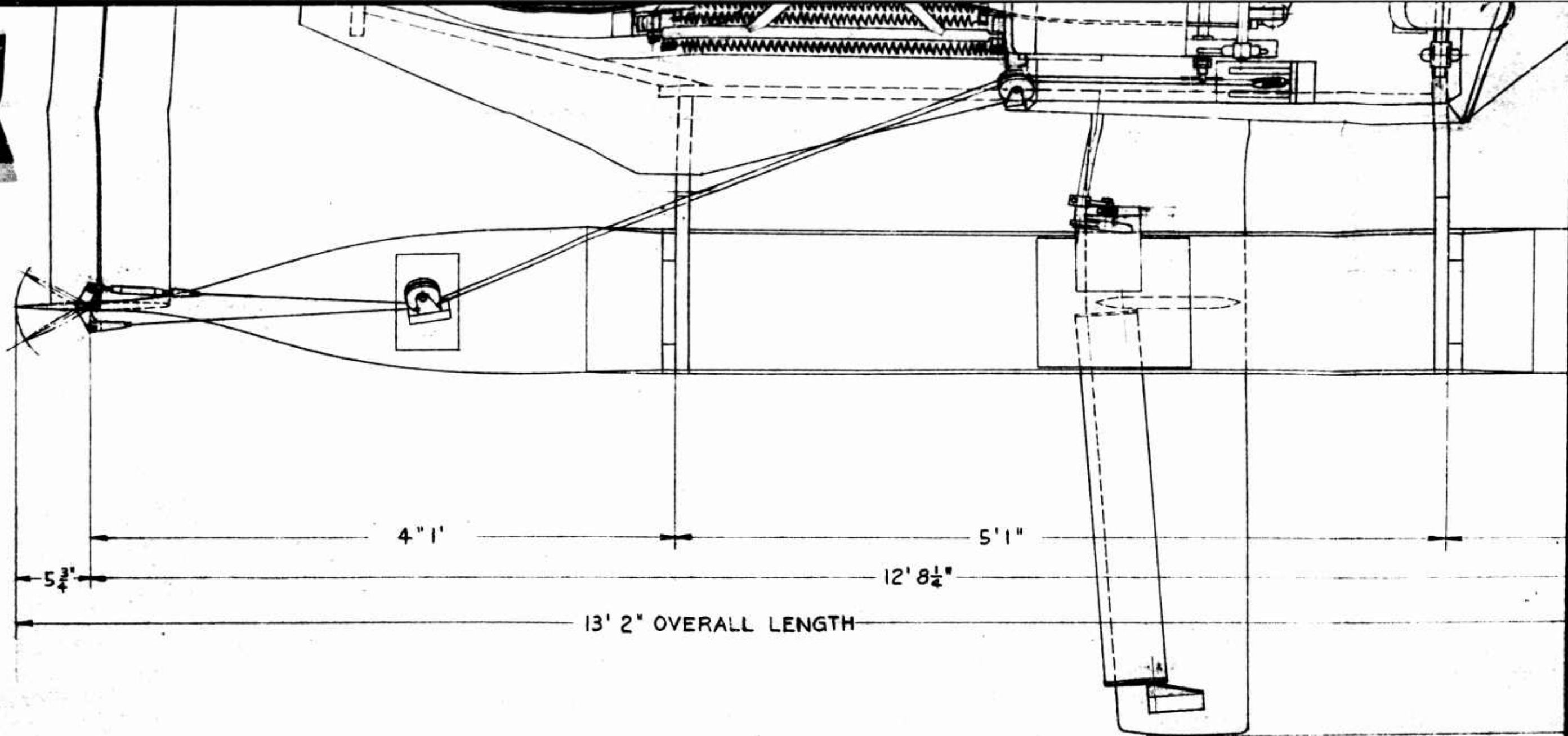
AILERONS NACA 64,-4
CHORD
THICKNESS
AREA PROJECTED (EA

LOAD DISTRIBUTION WITH
SEAT FULL AFT
MAIN FOIL CARRIES
REAR FOIL CARRIES
SEAT FULL FORE (4½"
MAIN FOIL CARRIES
REAR FOIL CARRIES

PROPULSION

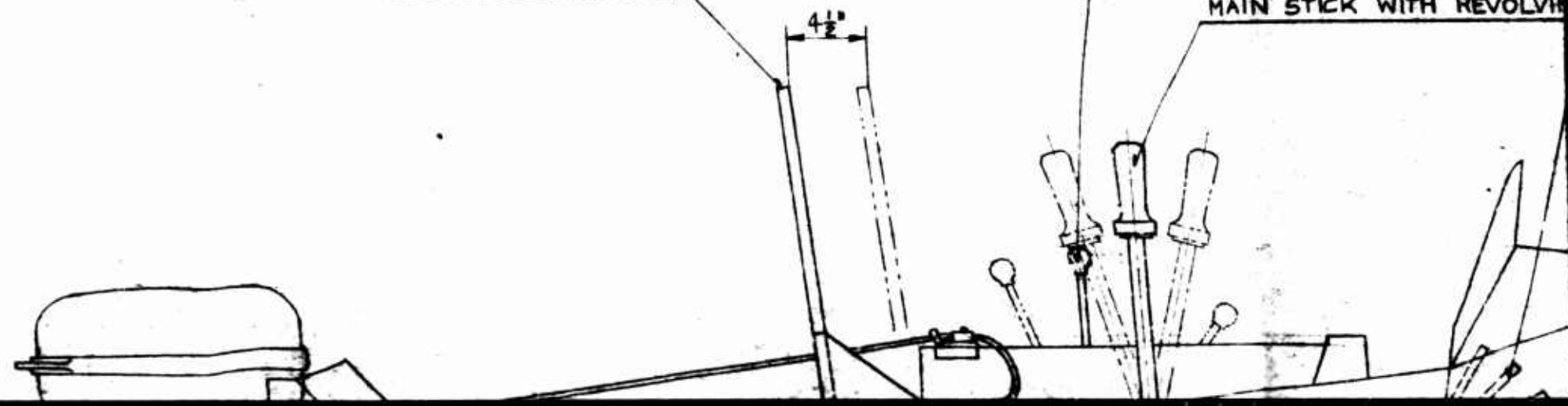
LENGTH OVERALL	13' 2"	
BEAM (SPAN OF MAIN FOIL)	11'	
MAX. DRAFT WITH CREW (AFLOAT)	2' 10"	
WEIGHT OF CRAFT	405	LBS.
WEIGHT OF PILOT	180	LBS.
WEIGHT OF CRAFT WITH CREW	585	LBS.
MAIN FOIL NACA 64-208		
CHORD	12.5 "	
THICKNESS	1 "	
AREA PROJECTED	10.9	SQ. FT.
REAR FOIL NACA 64-208		
CHORD	9.25 "	
THICKNESS	.74 "	
AREA	3.95	SQ. FT.
AILERONS NACA 64,-412		
CHORD	6 "	
THICKNESS	.72 "	
AREA PROJECTED (EACH)	1.25	SQ. FT.
LOAD DISTRIBUTION WITH CREW		
SEAT FULL AFT		
MAIN FOIL CARRIES 508 LBS	86.8	%
REAR FOIL CARRIES 77 LBS	13.2	%
SEAT FULL FORE (4½")		
MAIN FOIL CARRIES 517 LBS	88.3	%
REAR FOIL CARRIES 68 LBS	11.7	%

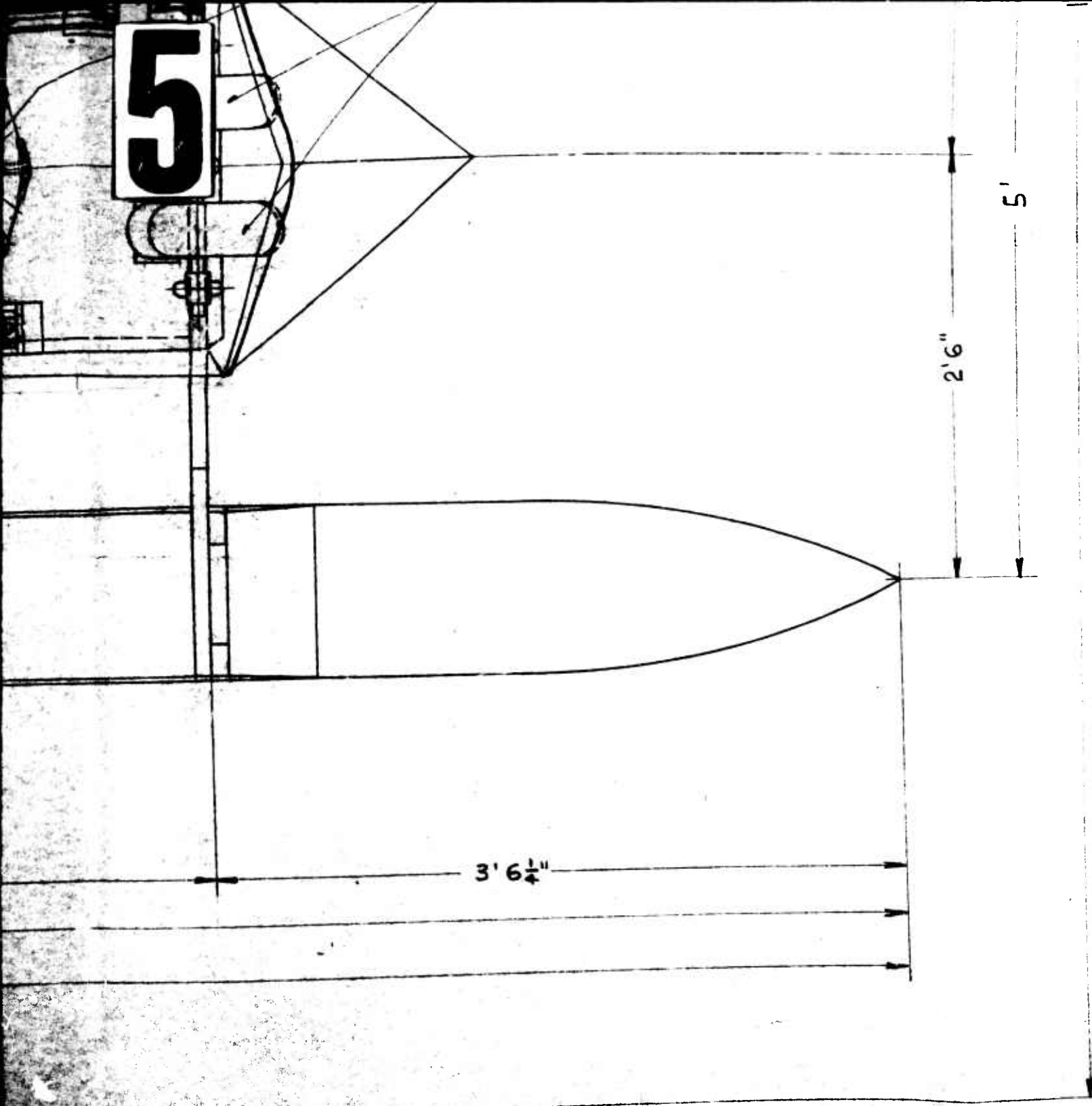
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ADJUSTABLE SEAT

AUXILIARY STICK
MAIN STICK WITH REVOLVING





THICKNESS
AREA PROJECTED

LOAD DISTRIBUTION
SEAT FULL AFT
MAIN FOIL CA
REAR FOIL CA
SEAT FULL FOR
MAIN FOIL C
REAR FOIL C

PROPULSION
MERCURY KF 5
PROPELLER DI

MOTOR SUPPORT
SPRING BALANC
MAX. VERTICAL

CONTROLS:
RIGHT HAND OF
A. STICK FOR
B. REVOLVIN
AND SPAR
LEFT HAND OF
C. AUXILIAR
D. ROPE FO
FEET OPERATE
E. DUAL PE

STICK
MAIN STICK WITH REVOLVING KNOB
DUAL PEDALS

6

SEAT FULL FORE ($4\frac{1}{2}$ ")

MAIN FOIL CARRIES 517 LBS

88.3

%

REAR FOIL CARRIES 68 LBS

11.7

%

PROPULSION

MERCURY KF5 OUTBOARD MOTOR

5

HP

PROPELLER DIA. x PITCH

 $6\frac{3}{4} \times 6\frac{1}{2}$

IN.

MOTOR SUPPORT

SPRING BALANCED PARALLELOGRAM

MAX. VERTICAL MOVEMENT

2'

CONTROLS:

RIGHT HAND OPERATES:

A. STICK FOR ELEVATION FLAP CONTROL

B. REVOLVING KNOB FOR ENGINE THROTTLE
AND SPARK ADVANCE CONTROL

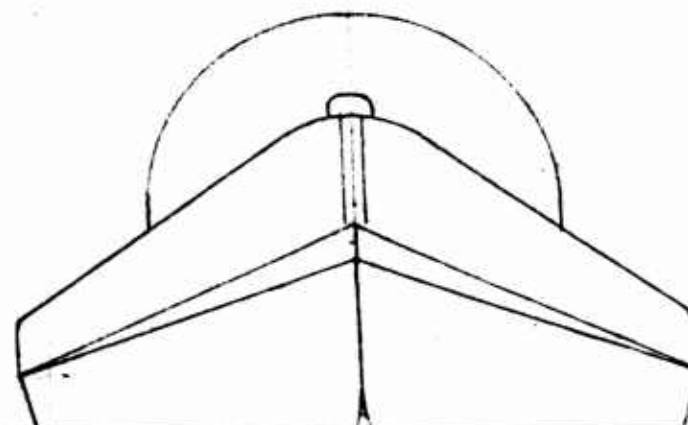
LEFT HAND OPERATES:

C. AUXILIARY STICK FOR DUAL RUDDER CONTROL

D. ROPE FOR ENGINE LOWERING.

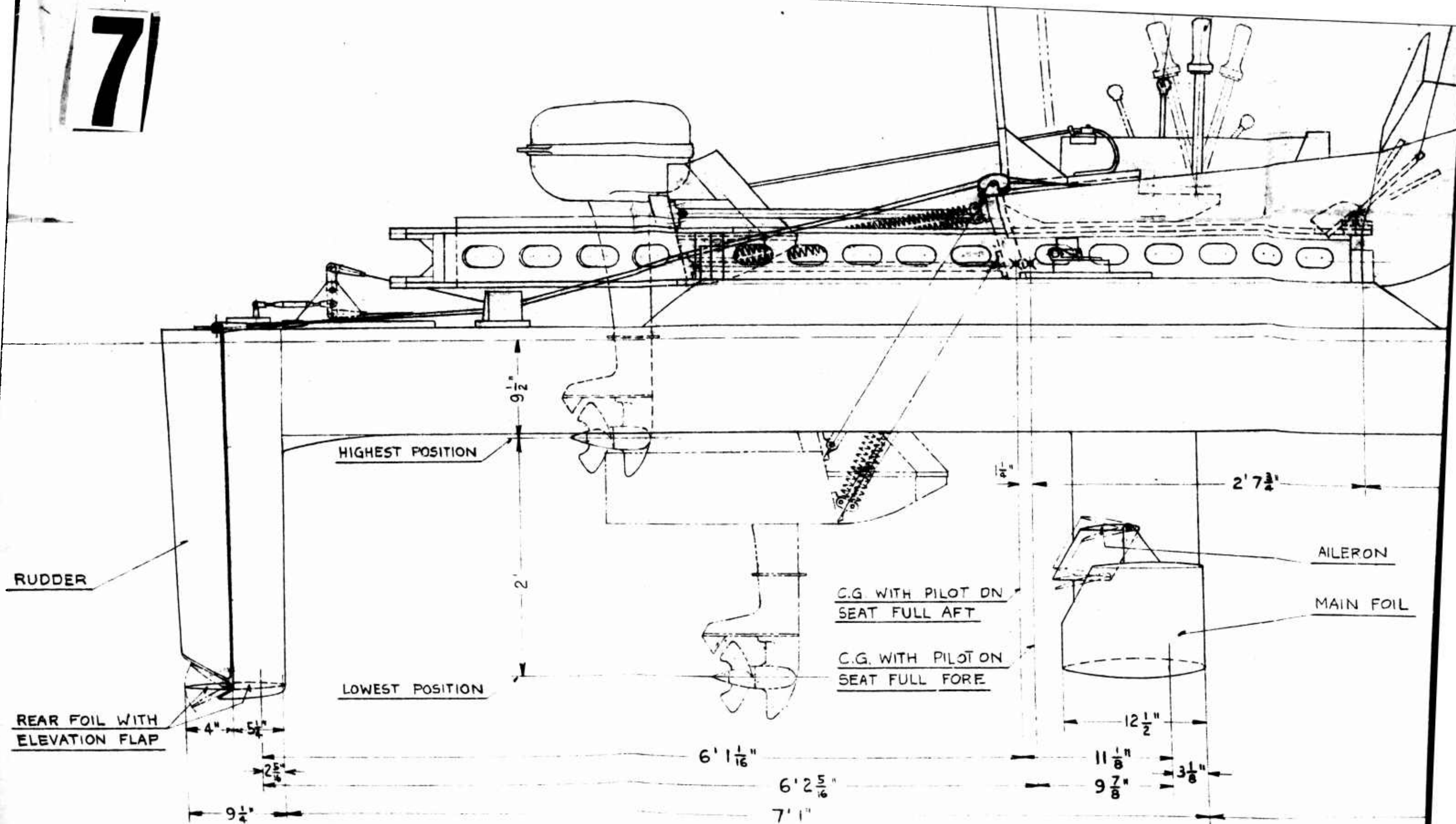
FEET OPERATE:

E. DUAL PEDAL FOR AILERONS CONTROL

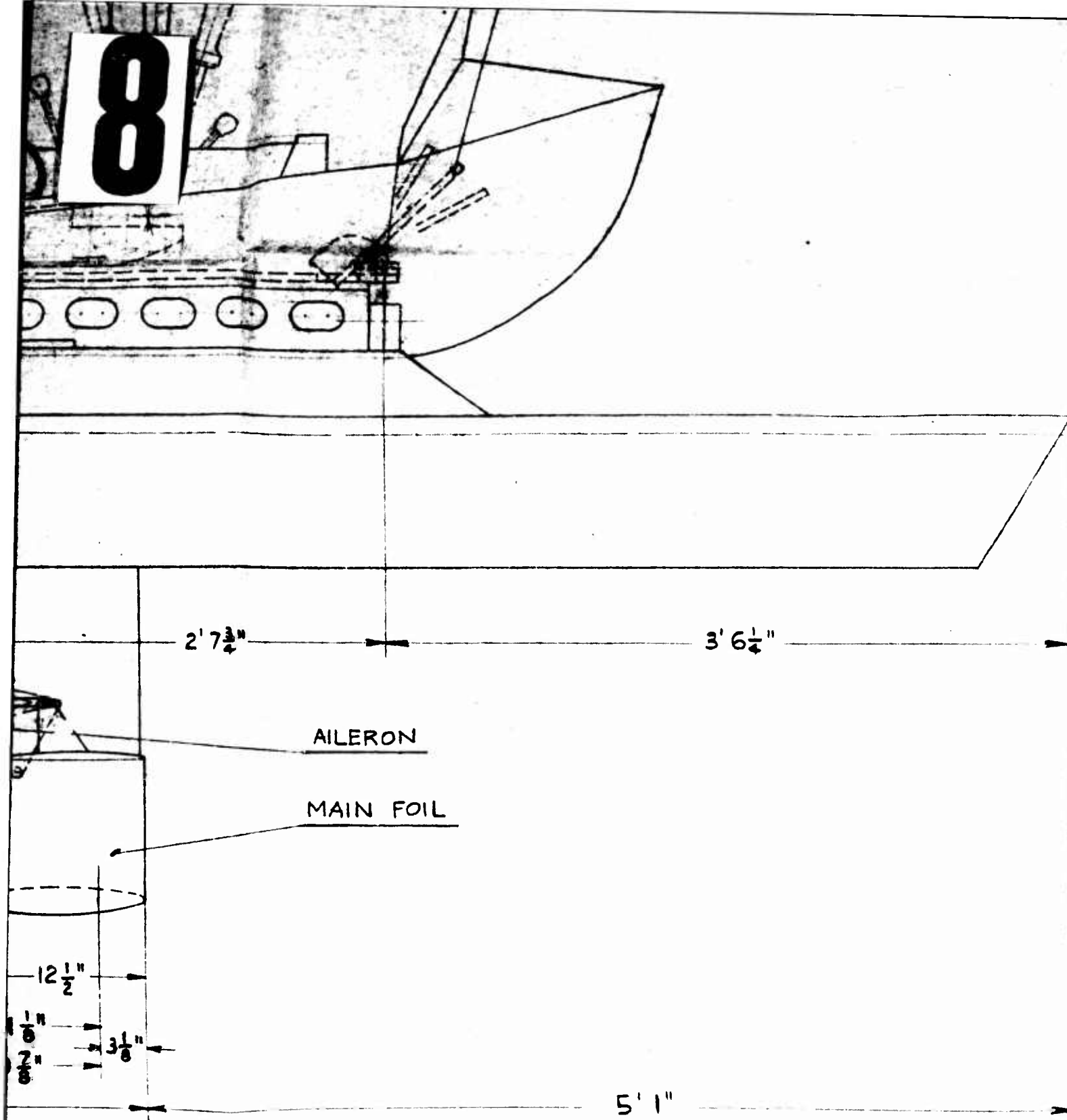


12"

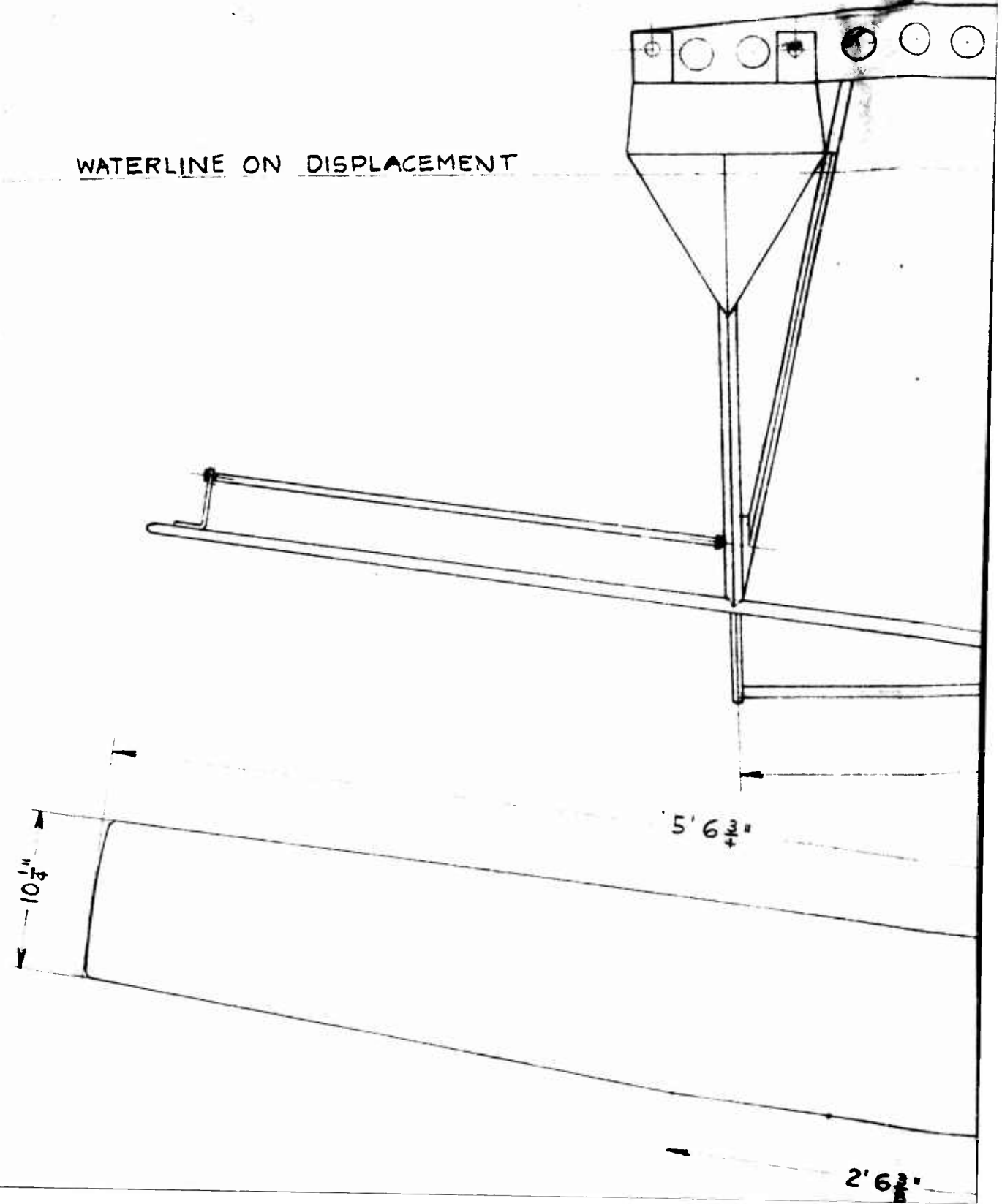
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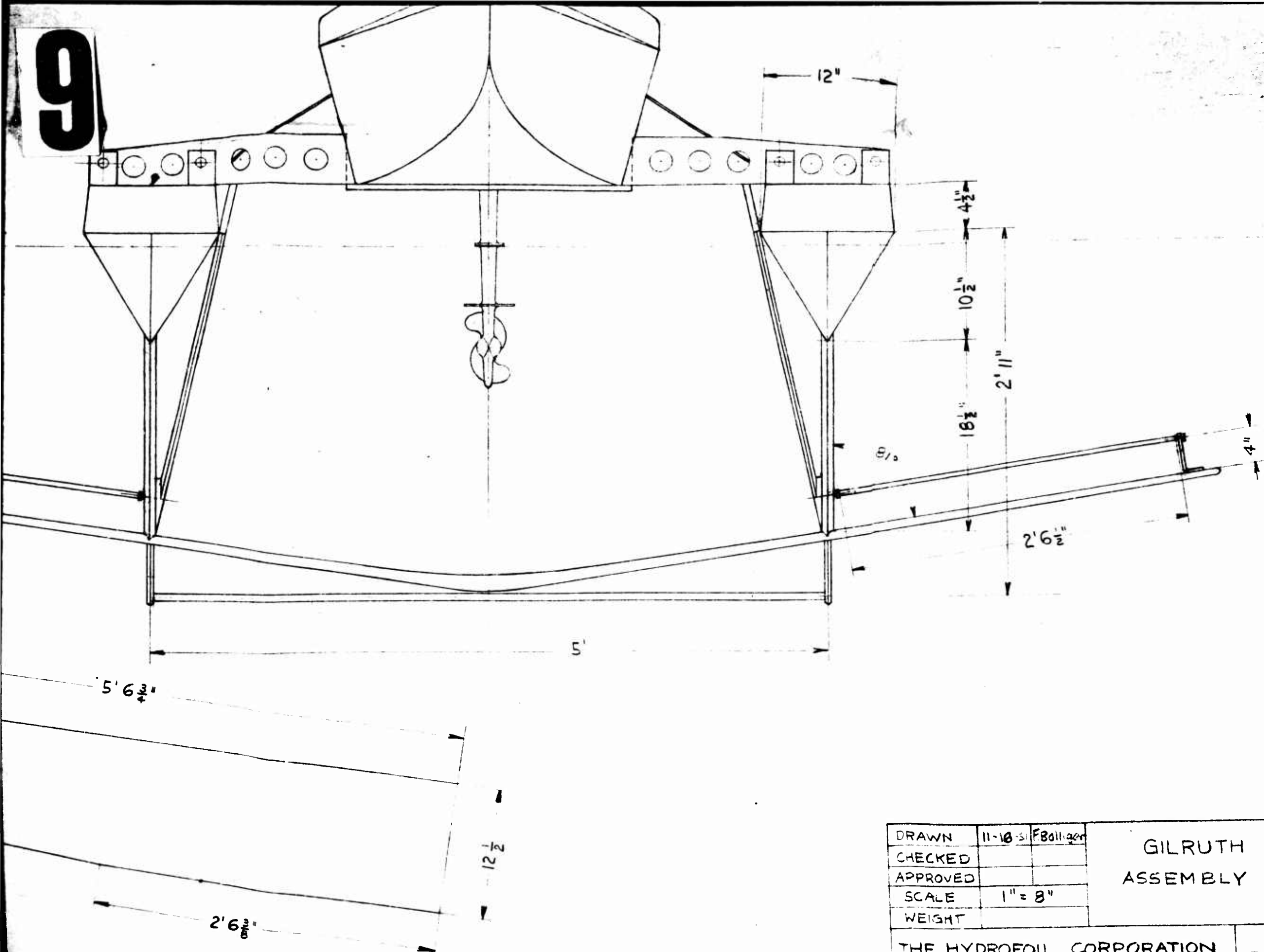
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WATERLINE ON DISPLACEMENT



9



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DRAWN	11-18-51	F. Ballinger
CHECKED		
APPROVED		
SCALE	1" = 8"	
WEIGHT		

GILRUTH BOAT
ASSEMBLY DRAWING

THE HYDROFOIL CORPORATION

DWG. NO. 1067

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